

REMARKS

The amendment at page 10, line 18, of the specification corrects an obvious typographical error. Elsewhere in the specification the compound is printed correctly as  $\text{LiPF}_6$  (see page 9, line 23; page 10, lines 12, 21 and 22; page 11, line 6; page 15, lines 6 and 27; original claim 4 and original claim 5).

The claims now in the application are claims 21-24. Claim 21 has been amended and claims 23-24 have been added. The molar ratio of claim 21 has been deleted by amendment. The claim without that limitation is supported at page 10, lines 16-18, of the original specification. From lines 6-18 of page 10, it will be seen that the two components were designated as (A) and (B). The indefiniteness was caused by the inadvertent omission of the (A).

Claim 21 has been objected to and, as discussed above, that objection should be obviated by the present amendment.

The recitation judged by the examiner not to be in the priority document has been deleted from the claim as discussed above. Akio should no longer be available as a reference.

Claims 21 and 22 stand rejected under 35 USC § 102(e) as being anticipated by Narang et al., US 5,830,600 (Narang). This rejection is respectfully traversed.

The fabrication of Li-ion storage cells is disclosed at page 12, lines 21-22, of the present application, referring to the cited documents of the prior art. Said cells comprise an anode and a cathode, separated from each other by a suitable separator.

It is well known that the performance of Li-ion storage cells is strongly determined by the durability of the electrolyte.

In the event of small leaks in the separator, the cell can suffer from an electrical fault. As a result, the cell is self-heating up to approximately 150°C. Above 150°C decomposition of the electrolyte can occur. That decomposition is exothermic and leads to more self-heating and increasing temperature. Under those conditions the cell is likely to be destroyed by explosion. For safety reasons the cell normally is provided with a safety valve to release material in form of a hot aerosol, when decomposition occurs. But nevertheless, said aerosol is inflammable in contact with air and can even explode. Therefore, it is of extreme importance that during heating up no decomposition of the electrolyte will occur. The thermal stability of said electrolytes should be as high as possible.

Narang discloses the potential explosive hazard of fire-retardant electrolyte compositions. The electrolyte consists of  $\text{LiPF}_6$  as the conducting salt and a mixture of triethylphosphate, methoxyethyl diethylphosphate and di-tert-butyl dicarbonate as solvent (Narang, col. 19, line 54, to col. 20, line 11). That system shows exothermic behavior above 160°C, with two maxima, one at 178°C and another one between 200 and 230°C. Thus, disadvantageous and possibly hazardous decomposition occurs above 160°C.

In Table 2, Narang discloses an electrolyte consisting of  $\text{LiPF}_6$  in tris(methoxyethyl)phosphate (TMEP). The potential explosivity of the compositions in

Table 2 is not given. However, one of ordinary skill in this art could reasonably conclude that the systems in Table 2 would exhibit similar behavior to that discussed above because, according to the Narang document itself, exothermic behavior continues above 160°C.

Narang disclose only that the total heat liberated from the exothermic behavior discussed above was less only than was true of "commercial" battery electrolytes (col. 20, lines 7-12). There is no explicit disclosure, nor is there any reason to believe that the electrolytes of Narang could be safely used above 150°C.

In contrast to Narang, the specification of the present application discloses that the esters described in the context of the invention can be employed as a solvent for Li-ion storage cells at at least about 150°C (page 7, lines 15-17). In other words, the combinations of (A) and (B) claimed in the instant claims can be used at higher temperatures. Particular preference is given to the use of the esters of formula (Ia) to (Va) in conjunction with  $\text{LiBF}_4$  as conducting salt (claim 24), with the greatest preference being given to the combination of the ester of the formula (IIIa) with  $\text{LiBF}_4$  as conducting salt (claim 23). A further preference is disclosed for the second alternative of claim 21, i.e., a mixture of  $\text{LiBF}_4$  and  $\text{LiPF}_6$  (see page 10, lines 20 et seq. of the original specification).

The requirements of a reference to be an anticipation are well established. They have been discussed in the previous amendments. The single disclosure of lithium salts with  $\text{BF}_4$  anions indicated by the examiner among the plethora of lithium

compounds disclosed, together with a specific selection from the broad class of solvents disclosed can not be properly considered to anticipate applicants' claims, particularly claims 23 and 24, in light of those requirements. Thus, the rejection is fundamentally flawed, even apart from all of the foregoing discussion.

In light of the foregoing amendments and remarks, it is considered that all objections and rejections of record have been obviated, and allowance of this application is respectfully solicited.

**A check in the amount of \$110.00 is attached to cover the required one month extension fee.**

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,

KEIL & WEINKAUF

A handwritten signature in black ink, appearing to read 'Melvin Goldstein', written over the printed name.

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

Amend the paragraph on page 10, lines 15-18, as follows:

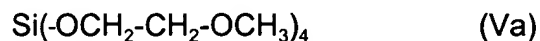
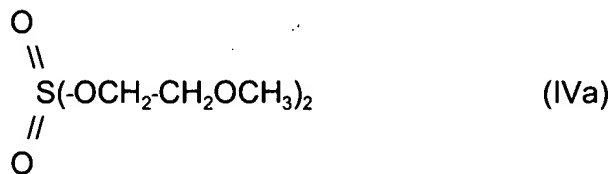
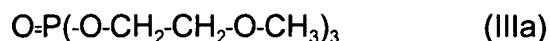
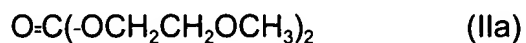
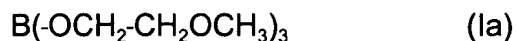
this composition preferably comprising, as the compound (A), at least one ester of formulae (Ia) to (Va), more preferably the ester of formula (IIIa), in each case in conjunction with  $[\text{LiBF}_6]$   $\text{LiPF}_6$ , and/or  $\text{LiBF}_4$  as compound (B).

**IN THE CLAIMS**

Amend claim 21 and add new claims 23 and 24 as follows:

21. (amended) A composition comprising

(A) at least one compound selected from the group consisting of formulae (Ia) to (Va)



and

(B) a conducting salt  $\text{LiBF}_4$  or a mixture of  $\text{LiBF}_4$  and  $\text{LiPF}_6$  [with a molar ratio of

$\text{LiBF}_4\text{:LiPF}_6$  from 0.1:9.9 to 9.9:0.1].

23. (new) The composition as claimed in claim 21, wherein the at least one compound is the compound of the formula (IIIa).

24. (new) The composition as claimed in claim 23, wherein the conducting salt is  $\text{LiBF}_4$ .